

## G9 - Engineering Council AHEP Competencies for IEng and CEng

Career Learning Assessment (CLA) is an alternative means of gaining Engineering Council Registration at either Incorporated Engineer (IEng) or Chartered Engineering (CEng) status. IAgrE encourages those members with a lifelong experience of engineering to apply through this individual route to registration. The aim of the CLA route is to match member's knowledge, skills and experience to the equivalent Bachelors or Master Degree. In the same way, for many students following an undergraduate or post graduate degree, this will be accredited as meeting the required knowledge, skills and understanding, either fully or partially. It is worth checking if your qualification already meets these standards – many do. This guidance uses the Engineering Council guidance on *The Accreditation of Higher Education Programmes (AHEP)* to show the know-how necessary for CLA candidates submitting an application for IAgrE assessment.

For Career Learning Assessment at <i>Incorporated Engineer</i> (IEng), which equates to Bachelor's Degree standard, candidates will need to demonstrate:	For Career Learning Assessment at <i>Chartered Engineer</i> (CEng), which equates to Master's Degree standard or above, candidates will need to demonstrate:
<p><b>Science and mathematics</b></p> <ul style="list-style-type: none"> <li>• Knowledge and understanding of the scientific principles underpinning relevant current technologies, and their evolution</li> <li>• Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles</li> </ul>	<p><b>Science and mathematics</b></p> <ul style="list-style-type: none"> <li>• A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies</li> <li>• Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply a range of mathematical and statistical methods, tools and notations proficiently and critically in the analysis and solution of engineering problems</li> <li>• Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and the ability to evaluate them critically and to apply them effectively</li> <li>• Awareness of developing technologies related to own specialisation</li> <li>• A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitations</li> <li>• Understanding of concepts from a range of areas, including some outside engineering, and the ability to evaluate them critically and to apply them effectively in engineering projects.</li> </ul>

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<p><b>Engineering analysis</b></p> <ul style="list-style-type: none"><li>• Ability to monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement</li><li>• Ability to apply quantitative methods in order to understand the performance of systems and components</li><li>• Ability to use the results of engineering analysis to solve engineering problems and to recommend appropriate action</li><li>• Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.</li></ul>	<p><b>Engineering analysis</b></p> <ul style="list-style-type: none"><li>• Understanding of engineering principles and the ability to apply them to undertake critical analysis of key engineering processes</li><li>• Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques</li><li>• Ability to apply quantitative and computational methods, using alternative approaches and understanding their limitations, in order to solve engineering problems and to implement appropriate action</li><li>• Understanding of, and the ability to apply, an integrated or systems approach to solving complex engineering problems</li><li>• Ability to use fundamental knowledge to investigate new and emerging technologies</li><li>• Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems.</li></ul>

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<p><b>Design</b></p> <ul style="list-style-type: none"> <li>• Be aware of business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics</li> <li>• Define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards</li> <li>• Work with information that may be incomplete or uncertain and be aware that this may affect the design</li> <li>• Apply problem-solving skills, technical knowledge and understanding to create or adapt design solutions that are fit for purpose including operation, maintenance, reliability etc.</li> <li>• Manage the design process, including cost drivers, and evaluate outcomes</li> <li>• Communicate their work to technical and non-technical audiences.</li> </ul>	<p><b>Design</b></p> <ul style="list-style-type: none"> <li>• Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics</li> <li>• Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards</li> <li>• Work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies</li> <li>• Apply advanced problem-solving skills, technical knowledge and understanding to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal</li> <li>• Plan and manage the design process, including cost drivers, and evaluate outcomes</li> <li>• Communicate their work to technical and non-technical audiences</li> <li>• Demonstrate wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations</li> <li>• Demonstrate the ability to generate an innovative design for products, systems, components or processes to fulfil new needs.</li> </ul>

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<p><b>Economic, legal, social, ethical and environmental context</b></p> <ul style="list-style-type: none"> <li>• Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct</li> <li>• Knowledge and understanding of the commercial, economic and social context of engineering processes</li> <li>• Knowledge of management techniques that may be used to achieve engineering objectives</li> <li>• Understanding of the requirement for engineering activities to promote sustainable development</li> <li>• Awareness of relevant legal requirements governing engineering activities, including personnel, health &amp; safety, contracts, intellectual property rights, product safety and liability issues</li> <li>• Awareness of risk issues, including health &amp; safety, environmental and commercial risk.</li> </ul>	<p><b>Economic, legal, social, ethical and environmental context</b></p> <ul style="list-style-type: none"> <li>• Understanding of the need for a high level of professional and ethical conduct in engineering, a knowledge of professional codes of conduct and how ethical dilemmas can arise</li> <li>• Knowledge and understanding of the commercial, economic and social context of engineering processes</li> <li>• Knowledge and understanding of management techniques, including project and change management, that may be used to achieve engineering objectives, their limitations and how they may be applied appropriately</li> <li>• Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate</li> <li>• Awareness of relevant legal requirements governing engineering activities, including personnel, health &amp; safety, contracts, intellectual property rights, product safety and liability issues, and an awareness that these may differ internationally</li> <li>• Knowledge and understanding of risk issues, including health &amp; safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to evaluate commercial risk</li> <li>• Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction.</li> </ul>

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<p><b>Engineering practice</b></p> <ul style="list-style-type: none"> <li>• Knowledge of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc)</li> <li>• Understanding of and ability to use relevant materials, equipment, tools, processes, or products</li> <li>• Knowledge and understanding of workshop and laboratory practice • Ability to use and apply information from technical literature</li> <li>• Ability to use appropriate codes of practice and industry standards</li> <li>• Awareness of quality issues and their application to continuous improvement</li> <li>• Awareness of team roles and the ability to work as a member of an engineering team.</li> </ul>	<p><b>Engineering practice</b></p> <ul style="list-style-type: none"> <li>• Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc.)</li> <li>• Knowledge of characteristics of particular equipment, processes, or products, with extensive knowledge and understanding of a wide range of engineering materials and components;</li> <li>• Ability to apply relevant practical and laboratory skills</li> <li>• Understanding of the use of technical literature and other information sources</li> <li>• Knowledge of relevant legal and contractual issues</li> <li>• Understanding of appropriate codes of practice and industry standards</li> <li>• Awareness of quality issues and their application to continuous improvement</li> <li>• Ability to work with technical uncertainty</li> <li>• A thorough understanding of current practice and its limitations, and some appreciation of likely new developments</li> <li>• Ability to apply engineering techniques taking account of a range of commercial and industrial constraints</li> <li>• Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.</li> </ul>
<p><b>Additional general skills</b></p> <ul style="list-style-type: none"> <li>• Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities</li> <li>• Plan self-learning and improve performance, as the foundation for lifelong learning/CPD</li> <li>• Plan and carry out a personal programme of work</li> <li>• Exercise personal responsibility, which may be as a team member.</li> </ul>	<p><b>Additional general skills</b></p> <ul style="list-style-type: none"> <li>• Apply their skills in problem solving, communication, working with others, information retrieval and the effective use of general IT facilities</li> <li>• Plan self-learning and improve performance, as the foundation for lifelong learning/CPD</li> <li>• Monitor and adjust a personal programme of work on an on-going basis</li> <li>• Exercise initiative and personal responsibility, which may be as a team member or leader.</li> </ul>